

THE MOSASAUR



THE JOURNAL OF
THE DELAWARE VALLEY
PALEONTOLOGICAL SOCIETY

VOLUME V

JULY, 1993

THE MOSASAUR

The Journal of the Delaware Valley Paleontological Society

Co-Editors

William B. Gallagher

Bureau of Natural History
New Jersey State Museum
New Jersey Department of State
CN-530
Trenton, NJ 08025-0530

Earle E. Spamer

Academy of Natural Sciences
1900 Benjamin Franklin Parkway
Philadelphia, PA 19103-1195

Associate Editors

Donald Baird

Michael J. Balsai

Stephen J. G. Farrington

Business Manager

Bruce Mohn

Cover Artist

Data Entry

Marcia Bell

Marjorie Gallagher

Reviewers for Volume 5

Arthur E. Bogan
David Bohaska
C. S. Churcher
Edward Daeschler

Peter Dodson
Ralph Eschelman
Edward Gilmore
Barbara Grandstaff

Ernest L. Lunddelius
John Maisey
David C. Parris
Robert W. Purdy

THE MOSASAUR is published on an occasional basis by the Delaware Valley Paleontological Society in Philadelphia, Pennsylvania. Copyright © 1993 Delaware Valley Paleontological Society, Inc. ISSN 0736-3907. DVPS, Continental Station, P.O. Box 40235, Philadelphia, PA 19106-5235.

Additional copies of THE MOSASAUR may be purchased for \$18.00 U.S. Checks, bank drafts, or international money orders will be accepted only if payable in U.S. dollars. Payment is to be made to the order of the Delaware Valley Paleontological Society, or DVPS. ORDERS should be sent to "The Mosasaur," c/o Stephen Farrington, Business Manager, P.O. Box 42078, Philadelphia, PA 19101-2078. EDITORIAL CORRESPONDENCE should be sent to either of the Co-Editors. The editorial policy for THE MOSASAUR appears inside the back cover.

COVER — A reconstruction of the terrain at the Port Kennedy, Pennsylvania, sinkhole that preserved a Late Irvingtonian fauna and flora. (See the paper by Daeschler, Spamer, and Parris in this volume.) Rendered by Bruce Mohn, Copyright © Bruce Mohn.

The Delaware Valley Paleontological Society thanks the Department of Malacology, Academy of Natural Sciences of Philadelphia, for the facilities to produce the camera-ready pages of this volume. Page composition by Earle Spamer.

The Mosasaur
The Journal of the Delaware Valley Paleontological Society

Volume V

July 1993

Contents

Quaternary Paleontology

Records of musk oxen from the Atlantic Coastal Plain of North America JERRY N. McDONALD AND CLAYTON E. RAY	1
Quaternary vertebrates from the Virginia Coastal Plain DAVID C. PARRIS AND BARBARA SMITH GRANDSTAFF	19
Review and new data on the Port Kennedy Local Fauna and Flora (Late Irvingtonian), Valley Forge National Historical Park, Montgomery County, Pennsylvania EDWARD DAESCHLER, EARLE E. SPAMER, AND DAVID C. PARRIS	23
A Pleistocene horse from Connecticut SPENCER G. LUCAS	43
Late Pleistocene(?) land snails (Mollusca: Gastropoda) in "red earth" deposits of the Grand Canyon, Arizona EARLE E. SPAMER	47

Cretaceous-Tertiary Paleontology

An associated tiger shark dentition from the Miocene of Maryland MICHAEL D. GOTTFRIED	59
Further examination of the Woodbury and basal Englishtown Formations in Camden County and adjacent areas, New Jersey DANIEL KUEHNE	63
Probable occurrence of the shark genus <i>Palaeocarcharodon</i> (Neoselachii: Cretoxyrhinidae) in the Paleocene of New Jersey GERARD R. CASE	73
The Cretaceous/Tertiary mass extinction event in the northern Atlantic Coastal Plain WILLIAM B. GALLAGHER	75
Errata to Volume 4	155
Notice of Author Index and Index to Genera and Species in Volumes 1-5 of <i>The Mosasaur</i>	156
Back Issues	156

Quaternary Vertebrates from the Virginia Coastal Plain

DAVID C. PARRIS and BARBARA SMITH GRANDSTAFF
Bureau of Natural History, New Jersey State Museum
New Jersey Department of State
CN-530
Trenton, New Jersey 08625-0530

Introduction

THE RICH Quaternary fossil record of Virginia has long been of interest to vertebrate paleontologists (Eshelman and Grady, 1986). Many localities, including the locality described here, remain poorly studied and inadequately published however, and considerable opportunity exists for further research.

The Belvedere Beach locality in King George County is primarily known as a site for fossils of the Paleocene Aquia Formation (Gilmore, 1938; Ward, 1989). Two amateur paleontologists, Howard Lanza and William Beck, were permitted access for collecting in 1973 through the courtesy of the property owner, Oliver Besley. They discovered seven Quaternary mammal teeth, which they donated to the New Jersey State Museum (NJSM). These specimens formed the basis for the site data reported by Eshelman and Grady (1986), as site 26 of their report. Subsequent collections have yielded very little additional material, but there is reason to believe that renewed field work would be productive.

Geographic and Geologic Setting

The Belvedere Beach locality is situated on the south bank of the Potomac River just east of its confluence with Potamac Creek. The site is on the Passapatanzy U.S. Geological Survey topographic 7.5' quadrangle at north latitude 38°20'18" and west longitude 77°16'49".

The Paleocene Aquia Formation crops out in bluffs along the river bank, consisting of poorly consolidated glauconite and fine grained terrigenous clastics with abundant calcareous molluscan fossils and less common fossil bones, teeth and coprolites. All of the Quaternary mammalian fossils have been found as float along the beach below the outcrop (among many Paleocene fossils).

Overlying the Aquia Formation is a Quaternary stratum of reworked Aquia sediments, which in turn is overlain by a yellowish stratum of surface sands. The Quaternary deposits have been mapped by Onuschak (1973) who indicates fluvial-estuarine deposits for the area in question, with a small band of Holocene (fluvial) marsh deposits along the margin of the river (the beach sediments).

As yet we have been unable to determine which stratum (or strata) yielded the Quaternary mammalian fossils, although the stratum of reworked Aquia sediment is a probable source. Preservation of the mammalian teeth is similar in appearance to that of the shark teeth and bone fragments from the Aquia Formation, and they were probably deposited in sediments of similar composition, presumably the reworked Aquia Formation.

Paleontology

Order CARNIVORA
Family CANIDAE
Genus *Canis*

Canis sp.
(Figs. 1.6, 2.6)

REFERRED MATERIAL—NJSM 11973, an isolated premolar (probably the right lower third or fourth).

DISCUSSION—Although probably not identifiable to species, this specimen resembles the above-mentioned teeth in NJSM-B-130, *Canis latrans*, an eastern coyote.

Family URSIDAE
Genus *Ursus*

Ursus americanus Pallas
(Figs. 1.2, 1.3, 2.2, 2.3)

REFERRED MATERIAL—NJSM 11974, a right upper fourth pre-molar and NJSM 11978, a left upper second molar.

DISCUSSION—These teeth are indistinguishable from those of the living species. A third specimen was in the possession of Mr. O. Besley, the former property owner. We identified it as a second molar but did not study it in detail.

Order ARTIODACTYLA
Family TAYASSUIDAE
Genus *Mylohyus*

Mylohyus nasutus (Leidy)
(Figs. 1.4, 2.4-2.6)

REFERRED MATERIAL—NJSM 11975, a right upper first molar and NJSM 11976, a right upper second molar. Binocular microscopic examination reveals that these teeth have matching adjacent facets of wear and thus appear to be sequential molars from one individual. Another specimen, in the collection of William Besley, is also a right upper second molar. A cast of it (NJSM 15141) was provided by the Smithsonian Institution, National Museum of Natural History, which also has a cast, USNM 192838.

Family BOVIDAE
Genus *Bos*

Bos sp.
(Figs. 1.1, 2.1)

REFERRED MATERIAL—NJSM 11972, a left upper third premolar, buccal side.

DISCUSSION—After tentative identification this specimen was sent to Dr. Jerry McDonald for his opinion. His reply (McDonald, personal communication, 1990) was that the specimen appears to be the genus *Bos*, rather than *Bison*, based on sized, crown height, and

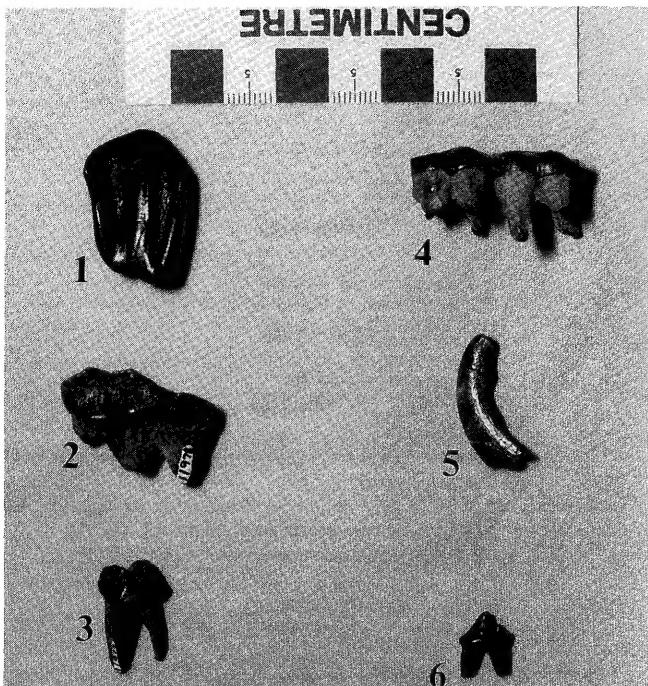


Figure 1. Belvedere Beach mammal teeth in side view. 1, *Bos* sp. (NJSM 11972), left upper third premolar, buccal view. 2, *Ursus americanus*, left upper second molar (NJSM 11978), lingual view. 3, *U. americanus*, right upper fourth premolar (NJSM 11974), lingual view. 4, *Mylohyus nasutus*, right upper first and second molars (NJSM 11975, 11976), lingual view. 5, Indeterminate mammal tooth (NJSM 11977). 6, *Canis* sp., premolar (NJSM 11973), lingual view.

details of occlusal surface. Presumably it is from a domestic animal (ox/cow).

UNDETERMINED MATERIALS

(Figs. 1.5, 2.6)

NJSM 11977 is as yet unidentified although it may be a canine fragment of a tayasuid.

Biostratigraphy

Ursus americanus has a substantial fossil record. A notable early occurrence is at Friesenhahn Cave, Bexar County, Texas, which ranges from 17000-19000 B.P. (Graham, 1987). The genus *Mylohyus* has a lengthy record well back into the Pleistocene, and has a terminal date of 9410 years B.P. from a site in Tennessee (Hester, 1967; Mead and Meltzer, 1984). The species *M. nasutus* also was found at Friesenhahn Cave (Lundelius, 1960). If the bovid premolar is of the genus *Bos*, rather than *Bison*, its similar preservation to the *Mylohyus* specimens (which are undoubtedly Pleistocene) indicates that the Quaternary beachwashed specimens are of mixed ages. This vexing possibility, all too common in coastal plain localities elsewhere (Parris, 1983), demonstrates the need for caution in dealing with localities of this kind. From the few specimens now available, a terminal age for the Belvedere



Figure 2. Belvedere Beach mammal teeth in occlusal view. 1, *Bos* sp. (NJSM 11972). 2, 3, *Ursus americanus* (NJSM 11978, 11974). 4, *Mylohyus nasutus* (NJSM 11975, 11976). 5, *M. nasutus* (NJSM 15141), cast of right upper second molar. 6, Indeterminate mammal tooth (NJSM 11977). 7, *Canis* sp. (NJSM 11973).

Beach deposits of about 9000-10,000 years B.P. seems likely although an older age is possible.

Conclusion and Recommendations

The Belvedere Beach sediments are probably late glacial or early post-glacial in age, but the possible presence of the domestic ox (*Bos*) suggests historical age sediments, possibly from middens or other dump sites, are present as well. This is a potentially important site, representing a coastal plain environment in the Quaternary of Virginia from which Pleistocene specimens have seldom been reported (Eshelman and Grady, 1986). Washing and screening techniques should be used in the bedded sediments overlying the Aquia Formation as part of a further collecting effort to increase the sample of mammalian fossils.

Acknowledgements

We thank Mr. Lanza and Mr. Beck for their discovery and donation of the specimens, as well as the late Mr. Besley, former property owner Mr. Twist Besley, and his son Mr. William Besley for their courtesies. Dr. Jerry N. McDonald provided much information and encouragement. Drs. Ralph Eshelman and William Gallagher discussed the specimens and encouraged further work and reporting of the materials. Field assistants were Larry Decina, George Fonger, Eugene Hartstein, Edward Lauginiger and David and Cathy Grandstaff. Mr. Ludwell Newton, caretaker of the property, was very helpful to us. The manuscript was reviewed by Drs. Ralph Eshelman, Jerry McDonald, and Clayton Ray and by David Bohaska, who also arranged for the opportunity to study the

Mylohyus specimen in the William Besley collection. Michael Balsai contributed editorial comments.

Literature Cited

Eschelman, R. and F. Grady. 1986. Quaternary vertebrate localities of Virginia and their Avian and Mammalian fauna. In: J.N. McDonald and S.O. Bird (eds.), *The Quaternary of Virginia—a symposium volume*. *Virginia Division of Mineral Resources Publication 75*, pp. 43-70.

Gilmore, C. W. 1938. Fossil snakes of North America. *Geological Society of America Special Paper 6*.

Graham, R. W. 1987. Late Quaternary mammalian faunas and paleoenvironments of the Southwestern Plains of the United States. *Illinois State Museum Scientific Paper 22*, pp. 24-87.

Hester, J. J. 1967. The agency of man in animal extinctions. In: P. Martin and H. E. Wright, Jr. (eds.), *Pleistocene extinctions, the search for a cause*. New Haven: Yale University Press, pp. 169-192.

Lundelius, E. L., Jr. 1960. *Mylohyus nasutus*, long-nosed peccary of the Texas Pleistocene. *Bulletin of the Texas Memorial Museum 1*, 40 pp.

Mead, J. I. and D. J. Meltzer. 1984. North American Late Quaternary extinctions and the radiocarbon record. In: P. Martin and R. G. Klein (eds.), *Quaternary extinction—a prehistoric revolution*. Tucson: University of Arizona Press, pp. 440-450.

Onuschak, E., Jr. 1973. Pleistocene-Holocene environmental geology. In: *Geologic Studies, Coastal Plain of Virginia*. *Virginia Division of Mineral Resources Bulletin 83*, Part 3, pp. 103-153.

Parris, D. C. 1983. New and revised records of Pleistocene mammals of New Jersey. *The Mosasaur 1*:1-21.

Ward, L. W. 1989. Tertiary stratigraphy of the central Virginia Coastal Plain. In: *Upper Cretaceous and Cenozoic geology of the south-eastern Atlantic Coastal Plain*. *28th International Geological Congress, Field Trip Guidebook T172*. Washington, D.C.: American Geophysical Union.

